

Applicant: Korolainen et al.
PCT App. No.: PCT/FI2005/050091
Preliminary Amendment filed September 21, 2006

Claim Listing

1–9. (canceled)

10 (new) A roll assembly in a paper/board machine or finishing machine comprising:
an inner non-rotating structure; and
a roll shell mounted for rotation about the inner non-rotating structure, wherein the inner non-rotating structure is at least partly comprised of composite material of reinforcing fibers in a matrix material.

11. (new) The assembly of claim 10, wherein the inner non-rotating structure is a fiber reinforced material beam essentially I-shaped in cross-section mounted between opposed thrust shafts.

12. (new) The assembly of claim 11, wherein the beam has upper portions which define a longitudinal groove, in which a support part holds a plurality of support elements in supporting engagement with the roll shell, the support part being of steel or cast iron and positioned on the fiber reinforced material beam by means of an intermediate layer which is selected to even out differences in thermal expansion between the support part and the beam and which intermediate layer fixes the support part to the beam.

13. (new) The assembly of claim 11, wherein the fiber reinforced material beam has a bottom portion to which are joined fiber-reinforced plates.

14. (new) The assembly of claim 11 wherein the fiber reinforced material beam has I-shaped ends mounted in receiving grooves in the thrust shafts.

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15. (new) The assembly of claim 14 wherein the I-shaped ends are secured by bolted joints to the thrust shafts.

16. (new) The assembly of claim 14 wherein the I-shaped ends are secured by gluing to the thrust shafts.

17. (new) The assembly of claim 10, wherein the inner non-rotating structure is a beam having a fiber-reinforced material lower portion and an upper part made of steel or cast iron fixed to the fiber-reinforced lower portion.

18. (new) The assembly of claim 17, wherein the upper part holds a plurality of support elements in supporting engagement with the roll shell.

19. (new) The assembly of claim 11 wherein the inner non-rotating structure has a first end mounted in receiving grooves in a thrust shaft.

20. (new) The assembly of claim 11 wherein the roll shell is supported in a deflection-compensated way on the inner non-rotating structure which forms a stationary shaft extending in a longitudinal direction, the shell being supported on the shaft by a plurality of loading elements, wherein the stationary shaft has a frame part made of composite material of reinforcing fibers in a matrix material, to which is mounted a support part of steel or cast iron extending in the longitudinal direction of the shaft for receiving the loading elements and for supporting them on the shaft arranged so as to exert a loading force against an inner surface of the shell to load the shell toward a backing roll forming a nip with the said roll.

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21. (new) The assembly of claim 12, further comprising stiffening plate elements of composite material for increasing the flexural stiffness of the shaft at selected points in the longitudinal direction of the shaft, mounted to a side of the shaft opposite to the support part and under tensile stress.

22. (new) The assembly of claim 11 wherein the roll shell is supported in a deflection-compensated way on the inner non-rotating structure which forms a stationary shaft extending in a longitudinal direction, the shell being supported on the shaft by a plurality of loading elements, and wherein the stationary shaft has a frame part of metal coated with fiber-reinforced composite material.

23. (new) The assembly of claim 11 wherein the structure is a suction box and the shell forms a suction roll.

24. (new) The assembly of claim 23, wherein the suction box has seals mounted to holder structures of composite material of reinforcing fibers in a matrix material, which form part of the structure.

25. (new) The assembly of claim 23, wherein the suction box is comprised essentially completely of composite material of reinforcing fibers in a matrix material.

26. (new) The assembly of claim 10 wherein the reinforcing fibers of the composite material extend essentially in the longitudinal direction of the structure.

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27. (new) A roll assembly in a paper/board machine or finishing machine comprising:
- a roll shell;
 - an inner non-rotating structure, wherein the roll shell is mounted for rotation about the inner non-rotating structure;
 - wherein the inner non-rotating structure comprises a steel or cast iron frame formed as an integrated structure with opposed end parts, each opposed end part having an opposed shaft journal by which the inner non-rotating structure is mounted;
 - wherein the opposed shaft journals define a neutral axis and wherein the frame has portions which define a free space in the frame in an area between the end parts where portions of the frame do not extend below the neutral axis, the frame defining a portion above the free space which comprises a member in compression; and
 - a fiber reinforced bar or plate connecting the opposed end parts and extending across the free space below the neutral axis to form a member in tension.
28. (new) The roll assembly of claim 27 wherein the fiber-reinforced bar or plate extends through each opposed end part and is locked in place to each opposed end part.
29. (new) The roll assembly of claim 27 wherein on each end part of the inner non-rotating structure are formed mounting projections; and wherein the opposite end parts are joined with each other by reinforcing fibers dipped in matrix material and wound in a longitudinal direction with respect to the frame neutral line, the reinforcing fibers dipped in matrix material forming the fiber reinforced bar or plate.